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Brazil's Changing Nuclear Goals: Motives and Constraints

Special National Intelligence Estimate
Memorandum to Holders

~~Secret~~

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Memorandum to Holders of SNIE 93-83

BRAZIL'S CHANGING NUCLEAR GOALS: MOTIVES AND CONSTRAINTS

Information available as of 5 December 1985 was used in the preparation of this Estimate, which was approved by the National Foreign Intelligence Board on that date.

THIS ESTIMATE IS ISSUED BY THE DIRECTOR OF CENTRAL INTELLIGENCE.

THE NATIONAL FOREIGN INTELLIGENCE BOARD CONCURS.

The following intelligence organizations participated in the preparation of the Estimate:

The Central Intelligence Agency, the Defense Intelligence Agency, the National Security Agency, the Federal Bureau of Investigation, and the intelligence organizations of the Departments of State and Energy.

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KEY JUDGMENTS

Brazil's new civilian government, which came to power in March 1985, inherited both a major safeguarded nuclear power and fuel-cycle program tied to an agreement with West Germany and a complex tapestry of indigenous, largely unsafeguarded, nuclear research efforts run by the military services and the Nuclear Energy Commission (CNEN). Research activity and funding for the indigenous programs has continued to increase, while activity under the West German accord continues to be scaled down.

Despite Brazil's dissatisfaction with the progress of the West German deal, we doubt that Brazil will actually cancel the accord, and we believe that Brazil will continue its efforts to master the nuclear fuel cycle irrespective of outside factors. This is reflective of its overall quest for major-nation status.

Each of the Brazilian military services has its own nuclear research and development projects that are supported by CNEN and its nuclear research institutes.

We judge that Argentina's surprise announcement in late 1983 of an enrichment capability has greatly spurred the Brazilians. Argentina's nuclear program is more advanced than Brazil's, and some military officers apparently believe that Buenos Aires has built, or can now build, nuclear weapons and that Argentina poses a potential military threat to Brazil.

Over the past two years there have been severe budget cuts affecting the safeguarded power program, but economic factors have not hampered the nuclear research efforts of the military. Although the

civilian government cut overall military budgets, no cuts have been noted in any military nuclear programs. We believe that in the long run economic factors will not constrain the Brazilians if they are determined to pursue this indigenous program.

We do not believe that the Brazilian Government has decided to produce nuclear weapons. A number of recent reports, taken together, do suggest that segments of Brazil's nuclear establishment, particularly the military, are now intent on acquiring facilities and expertise that would in the future give them the capability to produce nuclear weapons. We believe it would be at least 1990 before a nuclear explosive device could be ready for testing if the order to produce a weapon were given immediately.

Brazil is working on a two-stage sounding rocket called the Sonda IV, and on a larger satellite-launch vehicle. The Sonda IV could possibly be configured to carry a nuclear warhead, but we have only fragmentary evidence at this time that Brazil has any plans for its military use.

Brazil is a member of the International Atomic Energy Agency, (IAEA) and all nuclear cooperation agreements signed to date are subject to IAEA safeguards. We believe, however, that tension will persist between Brazil's limited acceptance of safeguards and compromises that may be necessary to ensure success in the indigenous program

Illustrative of the suspicion that characterizes Brazil's view of Argentina's nuclear aspirations has been the inability of Buenos Aires to interest Brasilia in reaching a substantive nuclear accord that would involve no-nuclear-weapons pledges and joint inspection of nuclear facilities

If other countries in the region were to perceive that Brazil was intent on acquiring either plutonium or highly enriched uranium, it would have a detrimental impact on regional stability. We would expect Brazilian-Argentine relations, which, outside of the nuclear context, are currently quite good, to deteriorate quickly. The perception that an Argentine-Brazilian nuclear arms race was under way would probably exacerbate other regional rivalries.

The current direction of Brazil's national nuclear program, and the prominent role of the military in it, presents a danger to US interests in Brazil. Brazil would almost certainly react negatively to any overt US moves designed to deter Brasilia from pursuing its nuclear objectives.

DISCUSSION

Background on Nuclear Program Inherited by New Civilian Government

1. Brazil's new civilian government, which came to power in March 1985, inherited both a major nuclear power and fuel-cycle program and a complex tapestry of indigenous, largely unsafeguarded, nuclear research efforts run by the military services and the Nuclear Energy Commission (CNEN). In 1975, Brazil entered into an agreement with West Germany to develop a nuclear power program to supply its growing demand for electrical energy and to reduce its dependence on imported oil. As originally envisioned, the agreement with West Germany called for the construction of up to eight power reactors, plus uranium enrichment and spent-fuel reprocessing facilities. The terms of the agreement also provided for a large measure of technology transfer from West Germany to Brazil. By the early 1980s, however, soaring development costs, reduced government revenues, technical problems, and lowered projections of future electrical energy needs have resulted in a general scaling down of the safeguarded nuclear power program, which was run by the government corporation NUCLEBRAS.

2. By 1981, Brazil was also actively working on indigenous, and unsafeguarded, nuclear research and development programs, and the military services were involved in projects that included research on uranium enrichment, reprocessing, and reactor design. Since late 1982, the Brazilian National Security Council (CSN) has placed these indigenous efforts under the auspices of the CNEN. Research activity and funding for the indigenous program, begun before the civilians took office, has continued to increase as the government seeks to keep pace with perceived Argentine advancements, curry favor with the military, and find work for the scientific/technical personnel no longer needed for the nuclear power program. Compared with the nuclear power program, these research efforts require substantially less money and also involve technologies that could lead to the production of fissile materials suitable for nuclear weapons.

3. We believe Brazil's determination to master the fuel cycle is reflective of its overall quest for major-nation status and is consistent with earlier drives to develop auto, aviation, steel, petroleum, and computer industries. We also judge that Brazil wishes to develop the capabilities that would enable it to build nuclear weapons at some time in the future. We further believe the change from a military to a civilian government has not altered these goals

4. some influential figures within the Brazilian military see the development of nuclear submarines, ballistic missiles, and nuclear weapons as important concomitants of Brazil's emergence as a great power. To the military, one of the lessons of the Falklands war was that Brazil's geopolitical position does not make it immune from conflict. While Argentina remains the most likely potential rival with whom hostilities may erupt, Brazilian military officials speak more generally about the need to have defensive forces able to meet threats from outside of the area. Although nuclear weapons are not specifically mentioned as having a role to play in Brazil's defensive posture, the ministers of the services have all noted that, they feel Brazil should master the nuclear fuel cycle and that, then, only "a political decision" would be necesary to determine whether to develop nuclear weapons.

Retreat From Nuclear Power

5. Despite the initial enthusiasm, Brasilia began publicly acknowledging as early as 1979 that the nuclear power program would be reduced:

- Recent estimates place the cost of completing the original agreement at close to $40 billion, over six times original estimates, while Brazil's ability to generate funds is restrained by economic austerity and its limited ability to borrow in overseas markets.
- According to Brazil's electric utility company ELECTROBRAS, growth rates for electricity demand have dropped sharply since the 1970s—and are likely to remain low through the 1990s—while supplies of cheap power from conventional sources are now coming on line.
- Brazil has encountered difficulty assimilating the complex West German nuclear technology, and

some nuclear officials have severely criticized the uranium enrichment facility's unproven technology (the Becker nozzle), which is substantially more expensive than planned.

6. Since taking office in March, the new civilian government has indicated both publicly and privately that the nuclear power program would be reexamined. The Minister of Mines and Energy has decided to limit future funding to the completion of the two power reactors currently under construction—in effect canceling six of the eight reactors. The fuel-cycle projects are also being cut back. The reprocessing headquarters of NUCLEBRAS has apparently been closed. The uranium enrichment plant, which would cost an estimated $3 billion to complete, will probably be substantially reduced in scale.

7. Last summer, President Sarney indicated privately that he intends to reduce the size and scope of NUCLEBRAS. Moreover, Sarney has appointed a blue-ribbon panel to evaluate Brazil's nuclear programs, and it is now touring the country. According to Sarney, the panel is primarily intended to justify the further downgrading of NUCLEBRAS to those few remaining proponents of a large nuclear power program. Sarney also indicated that he realized West Germany would mount a campaign to maintain the entire accord and that the negotiations to revise it would be difficult. He stated that the accord was a failure from Brazil's perspective.

8. Despite Brazil's dissatisfaction with the progress of the West German deal, we doubt that Brazil will actually cancel the accord. Both countries have too much at stake to completely sever nuclear relations. West German assistance will be needed to complete the work, albeit on a reduced scale, on the uranium enrichment facility. Brazilian nuclear technicians and scientists continue to receive training in West Germany, and reporting indicates that Brazilian authorities want this training to continue. West Germany could also serve as a convenient source of equipment and materials for the indigenous nuclear program.

The National Nuclear Program: New Emphasis

9. We believe Brazil will continue its efforts to master the nuclear fuel cycle irrespective of outside factors. But we also judge that Argentina's late 1983 announcement of its enrichment capability has greatly spurred the Brazilians.

Argentina s nuclear program is more advanced than Brazil's, and some military officers believe that Buenos Aires has, or can now build, nuclear weapons, and that Argentina poses a potential military threat to Brazil.

Military Nuclear Projects

10. Each of the Brazilian military services has its own nuclear research and development projects that are supported by CNEN and its nuclear research institutes. These projects encompass a wide range of nuclear technology and facilities that, if completed and operated successfully, conceivably could give Brazil the capability to develop a nuclear device by 1990. The current nuclear production capabilities are centered within the civilian nuclear research institutes, while the military services are constructing facilities for fissile material production.

11. ***Air Force.*** The Brazilian Air Force began a nuclear research and development program in 1979 at its Center for Aeronautical Technology (CTA) consisting of several projects including uranium enrichment using the gas centrifuge. During 1982 the program was expanded to include research on laser isotope separation. CTA may give some technical support to the Institute for Energy and Nuclear Research (IPEN) and the Brazilian Navy, which both have similar uranium enrichment projects under way.

[redacted]

[redacted]

13. ***Army.*** The Brazilian Army created its Special Projects Group (GPE) in November 1983 under its Army Technical Center (CTEX). The Army also placed its Institute for Research and Development (IPD) and its Institute for Military Engineering (IME) under the control of CTEX. GPE, which is located in Guaratiba adjacent to the Army's Marambaia High Explosives Proving Grounds, is staffed primarily with Army scientists and engineers and is funded primarily by the Brazilian National Security Council. [redacted]

[redacted]

Civilian Support

16. ***CNEN.*** The Nuclear Energy Commission (CNEN) is Brazil's organization for administering indigenous nuclear research and development. CNEN's president, Rex Nazare, is a staunch advocate of indigenous nuclear research, and he supports the military's research efforts both technically and bureaucratically. The various nuclear capabilities of CNEN's civilian institutes provide much needed technical support, training, and basic materials for the military's nuclear projects. [redacted]

17. ***IPEN.*** The Institute for Energy and Nuclear Research (IPEN) is Brazil's oldest nuclear research institute and its most capable in terms of trained manpower and operating facilities. IPEN's staff consists of primarily US-trained nuclear engineers and scientists. IPEN has developed on its own the technology and facilities for the production of uranium dioxide pellets, uranium hexafluoride, and uranium metal. IPEN fabricates research reactor fuel plates and operates its US-supplied 10-megawatt research reactor.

[redacted]

19. ***IEN.*** The Institute of Nuclear Engineering (IEN), located in Rio de Janeiro, also assists the military. Although its nuclear capabilities are not of the scale of those at IPEN, IEN provides technical assistance, materials, and equipment not provided by IPEN. IEN operates a 10-kilowatt research reactor supplied by the United States and is in the initial stages of constructing a 5-MW research reactor. IEN produces beryllium and has recently completed a new electronics laboratory to provide nuclear instruments and reactor components. IEN carries out the Brazil/

Italy Fast Breeder Reactor cooperation agreement and is building a sodium loop with Italian assistance. IEN hopes to construct a fast breeder reactor sometime after 1988, but these plans are not sufficiently concrete to justify Brazilian production of plutonium.

20. ***Sarney's Intentions.*** President Sarney plans to further increase the funding of the indigenous nuclear research programs, although it is not yet clear how much more money he is willing to provide. We believe the Brazilians fully intend to cutback NUCLEBRAS even more, thus making its personnel and technical support potentially available to expand the base of the indigenous program. This potential influx of personnel, many of whom have received extensive training from West Germany in reactor design and engineering, reprocessing, and uranium enrichment technologies, would strengthen Brazil's ability to pursue indigenous military and civilian nuclear programs. Sarney specifically indicated that one of his objectives in increasing the budgets of the national research efforts was to create jobs for former NUCLEBRAS personnel. Most NUCLEBRAS employees, some of whom have expressed their personal dislike for Rex Nazare, will have little choice but to go to work for him (or some future CNEN head) out of economic necessity.

Weapons Potential and Weapons-Related R&D

21. On balance, we do not believe that the Brazilian Government has decided to produce nuclear weapons. A number of recent reports, however, taken together, do suggest that segments of Brazil's nuclear establishment, particularly the military, are now intent on acquiring facilities and expertise that would give them the capability to produce nuclear weapons. Indications include:

22. The indigenous national nuclear program could, as structured, provide the technical base for a nuclear weapons program. Although each military service is developing different nuclear technologies, each can support and lend assistance to the other.

24. We have no hard evidence that Brazilian researchers are doing actual design work on a nuclear explosive device. We have some evidence, however, that theoretical work on plutonium and highly enriched uranium spherical configurations has taken place but that work does not constitute nuclear weapons design.

25. There is no evidence of high-explosives (HE) work relevant to nuclear weapons development. Brazil operates several large high-explosives production plants that may have the potential for development of high-explosives technology applicable to nuclear weapons.

26. Given the current absence of fissile material facilities, we believe it would be at least 1990 before a Brazilian nuclear device could be ready for testing if the order to produce a weapon were given immediately. Unless an enrichment facility or a plutonium production reactor and complementary reprocessing facility are built, Brazil will continue to face this four- to five-year gap.

Potential Delivery Systems

27. ***Missile Program.*** Brazil has two potential future nuclear-capable missile systems. The first of these is the Sonda IV, which is a two-stage sounding rocket. This system, which has been flight-tested twice, is capable of launching a 500-kilogram payload to a range of about 600 kilometers. The other system will be a satellite launch vehicle (SLV) that will be made up of several Sonda IV first stages. This vehicle is in the planning stage, and the Brazilians have stated that they expect it to be ready for its first flight in the early 1990s. In order to convert these two systems into ballistic missiles, the Brazilians would have to improve their capabilities in at least three areas: guidance technology, reentry vehicle technology, and production capability. Guidance technology would be the most demanding of these areas. Brazil probably would try to acquire the necessary technology from foreign sources and, in fact, recently signed an agreement with China that may allow the Brazilians access to such technology.

28. We believe the Sonda IV as configured could be used to carry a nuclear warhead. But we have only fragmentary evidence, at this time, that Brazil has plans for any military use of the Sonda IV. The Brazilians have, however, converted all other earlier (and far less capable) Sonda rockets (the Sonda I, II, and III) into military systems. They have some motivation for doing the same with the Sonda IV and the SLV, because there could be a world market for such systems. In addition, the Brazilians may become increasingly worried about the Argentine Condor missile, which is definitely a military vehicle and is also nuclear capable.

29. ***Aircraft.*** Brazil currently has over a dozen Mirage III-Es in its inventory. The French Air Force uses this plane to carry tactical nuclear weapons. The other planes in Brazil's current inventory are too small or lack ranges that would make them suitable platforms from which to drop nuclear weapons. Brazil will be adding the AMX attack plane, produced jointly with Italy, to its inventory in the late 1980s. Although not specifically designed to carry nuclear weapons, this plane could perform this role if the weapon is designed to weigh no more than 1,000 kilograms.

The Decisionmaking Environment

30. In our view, the preeminence of the indigenous nuclear research and development program is no longer a debated issue within the Brazilian establishment. The analysis of a number of trends leads us to this conclusion. NUCLEBRAS' decline has been an ongoing development since the late 1970s, along with the steadily growing realization that heavy dependence on foreign technology was unacceptable. In late 1982 the central government began the federalization of IPEN—formerly a Sao Paulo state entity. Though this has been contested on legal grounds, Brasilia has prevailed, and IPEN's formal subordination to CNEN is recognized. Over that period, IPEN and CNEN have steadily implemented more rigid security procedures in various projects, and the military's role in administering them has grown.

31. Brazil's armed forces have a long history of inter-service rivalries that could be a negative factor in their pursuit of their nuclear goals. There are some signs, however, that the military services are beginning to cooperate, albeit tentatively.

32. ***Economic Factors.*** Over the past two years, economic factors have not hampered the nuclear research efforts of the military, and this continues to be the case. Although the civilian government cut the overall budgets of the military, no cuts have been noted in any of their nuclear programs. On the contrary, sources have reported that the administrators of these programs believe that funding is currently not a problem for the level of research and development that has been authorized to date. A generally reliable

34. We believe that, in the long run, economic factors will not constrain the Brazilians, if they are determined to pursue this indigenous program. Brazil's economy is the ninth largest in the world, and we do not believe that Brasilia will have difficulty finding the $2-5 billion over the five to 10 years that probably would be required to bring the program to fruition. Only in the event of a radical shift to a highly populist regime—which we do not expect—would we forsee an effort to shift resources in ways that would seriously impede nuclear funding.

35. As indicated above, Brazil's civilian leaders have increased support for the indigenous nuclear program. We believe this provides a mantle of legitimacy to the programs started under the military government. Moreover, we believe that political support for the indigenous program will continue under the Sarney administration, reflecting a national consensus for mastering the nuclear fuel cycle as part of Brazil's drive to reach great-power status. There is no evidence of public opposition to the indigenous program.

Implications for US Policy and Regional Stability

36. ***International Posture.*** As the Brazilian indigenous nuclear programs progress, the proliferation implications of the military's new facilities will probably become the subject of international speculation and criticism. To fend off this criticism, Brazilian foreign policy will increasingly have to focus on defending and justifying these programs in a world in which there is considerable antiproliferation sentiment. Additionally, Brazil would not welcome the prospect of being lumped with other suspected nuclear proliferants, such as South Africa and Israel. We judge, however, that Brazil will be willing to bear these political costs if indeed it ultimately decides to move toward nuclear weapons

37. ***Nuclear Safeguards and International Obligations.*** We note that Brazil, as a member of the International Atomic Energy Agency, has pledged to require IAEA safeguards on all its nuclear exports. The Minister of Mines and Energy publicly reiterated in October 1985 that all nuclear cooperation agreements signed to date—with West Germany and China, among others—are subject to IAEA safeguards. According to the US Embassy in Brasilia, the chairman of CNEN said in September that Brazil favors universal, nondiscriminatory safeguards that do not inhibit development of peaceful uses of nuclear energy and that Brazil respects its joint commitments to the IAEA. Despite such pledges, it is our view that an inevitable and difficult tension is likely to persist between Brazil's limited acceptance of safeguards and the practical compromises that may be necessary to ensure success in the national program.

38. suggests a growing willingness by Brazil to sidestep some nuclear safeguards obligations and an incipient convergence between its safeguarded and unsafeguarded programs.

39. We believe the activities reported thus far would not in themselves dramatically advance Brazil's

efforts to master sensitive technologies such as reprocessing and enrichment. We also doubt that Brazil is now prepared to run the risks to its nuclear and other interests inherent in embarking on a series of unacknowledged violations for the sake of expediency. Nonetheless, we believe that when and if important aspects of the unsafeguarded program are perceived to be at stake, there will be pressures to violate safeguards on a selective basis.

40. ***Brazil and the Nonproliferation Regime.*** Brazil is not a party to the NPT and continues to firmly resist exhortations to accede to the agreement. Brazil historically has complained that the NPT is discriminatory in that it recognizes two unequal orders of nations, the nuclear weapon states and the nonnuclear weapon states. In our view, there is virtually no room for movement in this position, and determined resistance to the NPT, and to the nuclear suppliers mechanisms which it spawned, will continue in Brasilia.

41. While eschewing the NPT and the adoption of full-scope international safeguards on all its nuclear activities, Brazil has signed and ratified the Treaty of Tlatelolco. Brasilia has said that it will not waive that accord into force until all Latin America states have done so. Chile, Argentina, and Cuba are the holdouts at this time.

42. ***Regional Stability.*** Illustrative of the suspicion that characterizes Brazil's view of Argentina's nuclear aspirations has been the inability of Buenos Aires to interest Brasilia in reaching a substantive nuclear accord that would involve joint inspection of nuclear facilities, no-nuclear-weapons pledges, increased research and development efforts in the nuclear energy field, and cooperation in joint ventures to market nuclear equipment. During a visit to Argentina by Brazil's Foreign Minister in May 1985, Buenos Aires formally proposed this arrangement, according to the US Embassy there. In response, Brazil indicated only that it would study the initiative. By September, according to US Embassy reporting from Brasilia, the Argentine military had stifled enthusiasm for the idea at home, and in Brazil no work was in progress on the subject

45. If other countries in the region were to perceive that Brazil was intent on acquiring either plutonium or highly enriched uranium it would have a detrimental impact on regional stability. We would expect Brazilian-Argentine relations, which, outside of the nuclear context, are currently quite good, to quickly deteriorate. The perception that an Argentine-Brazilian nuclear arms race was under way would probably exacerbate other regional rivalries

46. ***US Interests.*** The failure of the international community in gaining Brazilian and Argentine adherence to the NPT does not bode well for future efforts directed at curtailing any efforts by these two rivals to build sensitive nuclear facilities and engage in nuclear weapons research. We believe that West Germany is likely to be accused of directly assisting both Brazil and Argentina in acquiring sensitive nuclear facilities or the technical expertise required to build and operate them. The source of this alleged responsibility is likely to be past West German assistance associated with Argentine and Brazilian nuclear power programs, which in both cases included some reprocessing capability and, in the Brazilian case, uranium enrichment.

47. The current direction of Brazil's national nuclear research and development efforts; the prominent role of the military in funding and administering these efforts; and the reputation of the CNEN President of favoring, at a minimum, the nuclear option present a danger to US interests in Brazil. Brazil will almost certainly react negatively to any overt US moves designed to deter Brasilia from pursuing its nuclear

objectives. Anti-US feeling will be fueled by any perceived pressure coming from Washington. This could adversely affect a wide range of bilateral issues such as military-to-military contacts, trade and finance issues, and science and technology agreements.

The Foreign Ministry might react by reducing contacts with US officials and by being less cooperative on a wide range of regional security initiatives, such as Contadora; and in other multilateral forums, such as supporting US positions in the United Nations. (S NF

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